

TWIN CITY LINES

Fall 2007





TWIN CITY LINES

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The Minnesota Streetcar Museum operates the Como-Harriet Streetcar Line in Minneapolis and the Excelsior Streetcar Line in Excelsior. Its mission is to preserve Minnesota's electric railway heritage.

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CORRECTIONS AND NEW INFO

Former Minnegazette editor Fred Rhodes writes:

Part of the photo caption on page 11 reads: "The [Minnesota Railfans] trip terminated at Snelling Station..." I was on that trip and it began and ended at East Side Station. We made about a one hour mid-afternoon stop at Snelling Station before returning to East Side Station.

I personally recall another reason that St. Paul lines were converted before Minneapolis lines. The first batch of GMC buses (Nos. 900-1004) arrived with the heavier steel spring suspensions. The buses were deemed too heavy to operate on Minneapolis city streets (but not St. Paul's). The only way Minneapolis would allow the buses on their city streets was if TCRT removed two seats from each bus! That didn't happen so all the new buses had to operate in St. Paul only. (Years later, I recall seeing some of the 900-1004 buses operating on the Interurban route in Minneapolis - either a sneak ploy by TCRT or a relaxing of the weight rule in Minneapolis - I never heard.) The rest of the GMC buses (Nos. 1005-1399) arrived with the more comfortable (and lighter) air suspension systems.

John Diers responds:

"Fred Rhodes' point about the conversion program requires clarification. There was a weight issue with the 900s but it didn't drive the decision to convert the St. Paul system before Minneapolis. Money did. Not only were the St. Paul lines the weakest in the system, (I recall seeing somewhere that Randolph and Grand were the only local lines that were

covering expenses, and, then, just barely) but St. Paul officials, particularly their public works people, wanted to be rid of the cars so they could make the downtown streets one way and begin a city-wide repaving program. That, and because the St. Paul system was self-contained, TCRT was able to take a whack at its operating overhead by closing down Duluth Station, the Number 2 and White Bear Garages, and two substations, Concord Street and Hope Street. The College Avenue sub stayed online until closure of the Interurban, and, of course, Snelling wasn't shut off until July of '54. It could also immediately start realizing salvage value from the removal of electrical cabling.

The weight issue didn't come up until the Minneapolis program was underway early '53. It was all part of the dispute over street repaving, and Minneapolis was using it as a bargaining chip to extract more money from TCRT. By threatening to hold up conversion over bus weight, the City was hoping it could wrangle more money from the company. When GM came out with the air suspension bus models the weight issue disappeared, and the City lost some of its leverage--until it invented other concerns that led to once a week franchise cars and the delayed closure of Lake Street Station. (Actually, the whole thing was a red herring because trucks with heavier axle weights were already allowed on Minneapolis streets). Minneapolis also came up with the bright idea of licensing buses which is something of a switch because St. Paul didn't. Minneapolis had no love for streetcars. It just wanted to squeeze as much as it could from the company.

MSM NEWS SUMMARY

See Streetcar Currents for the full story. ("<http://www.trolleyride.org>")

Historic streetcar photos now online

The Minnesota Streetcar Museum's archive contains some 10,000 images of vintage Minnesota streetcars. Over 400 of the best can now be viewed online. Go to MSM website "www.trolleyride.org" and click on the Historic Photos button. The photos reside on the Minnesota Reflections website, a compendium of the best photos from the state's small historical societies and museums. Now that MSM's are online, scanned copies can be ordered. Minnesota Reflections recently approved the scanning of an additional 250 photos for the website, and they should soon after you receive this issue of TCL.

MSM items on display at the Bakken

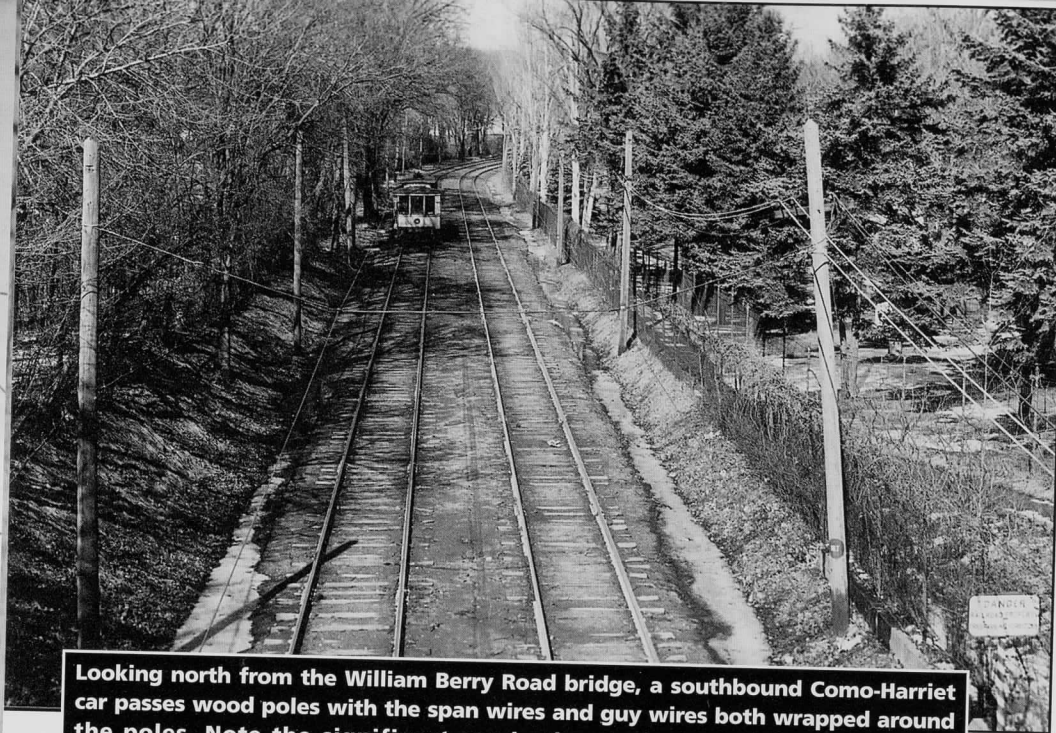
The Bakken Museum has mounted a new exhibit titled "Electrifying Minnesota". MSM participated by loaning a number of historic streetcar artifacts. MSM is now cooperating with the Bakken by exchanging brochures and linking websites. The two staffs will be meeting to brainstorm other joint activities.

Wirth Park streetcar shelter

A genuine streetcar waiting shelter still stands in Wirth Park, at the wye where the Glenwood Avenue line ended. It is a large open wood structure, measuring 16 by 26 feet. Under its sloped roof are two pairs of back-to-back wood benches. The shelter was built by TCRT in 1916 when the streetcar line was extended into the park. Even though the last

Front cover: Tom Fairbairn's article "Celestial Knitting" on page 4 explores the intricacies of TCRT's overhead wire. This is the east end of the Snelling Station yard. Beyond the sheer volume of "knitting" in the air, the photo shows the standard TCRT steel poles with their distinctive caps, multiple pull-offs from a single pole, suspension cables to stabilize frogs, and (top right) a section insulator. St. Paul Pioneer Press photo.

Inside front cover: In 1914, a suburban high-speed car waits at the Stillwater Union Depot for its departure to St. Paul. This issue tells all about these interurbans disguised as streetcars. See page 12. John Runk photo.



Looking north from the William Berry Road bridge, a southbound Como-Harriet car passes wood poles with the span wires and guy wires both wrapped around the poles. Note the significant sag in the span wire, to compensate for expansion and contraction caused by temperature extremes. Kirt Blewett photo.

streetcar to serve it ran in 1954, it has been maintained since then by the Minneapolis Park Board.

The Park Board has agreed to move the shelter to the new location next to the Como-Harriet Streetcar Line's northern terminus by Lake Calhoun. Museum volunteers are working with Park Board staff to finalize the site plan and prepare for the move. It is unclear if the shelter will move this fall or next spring.

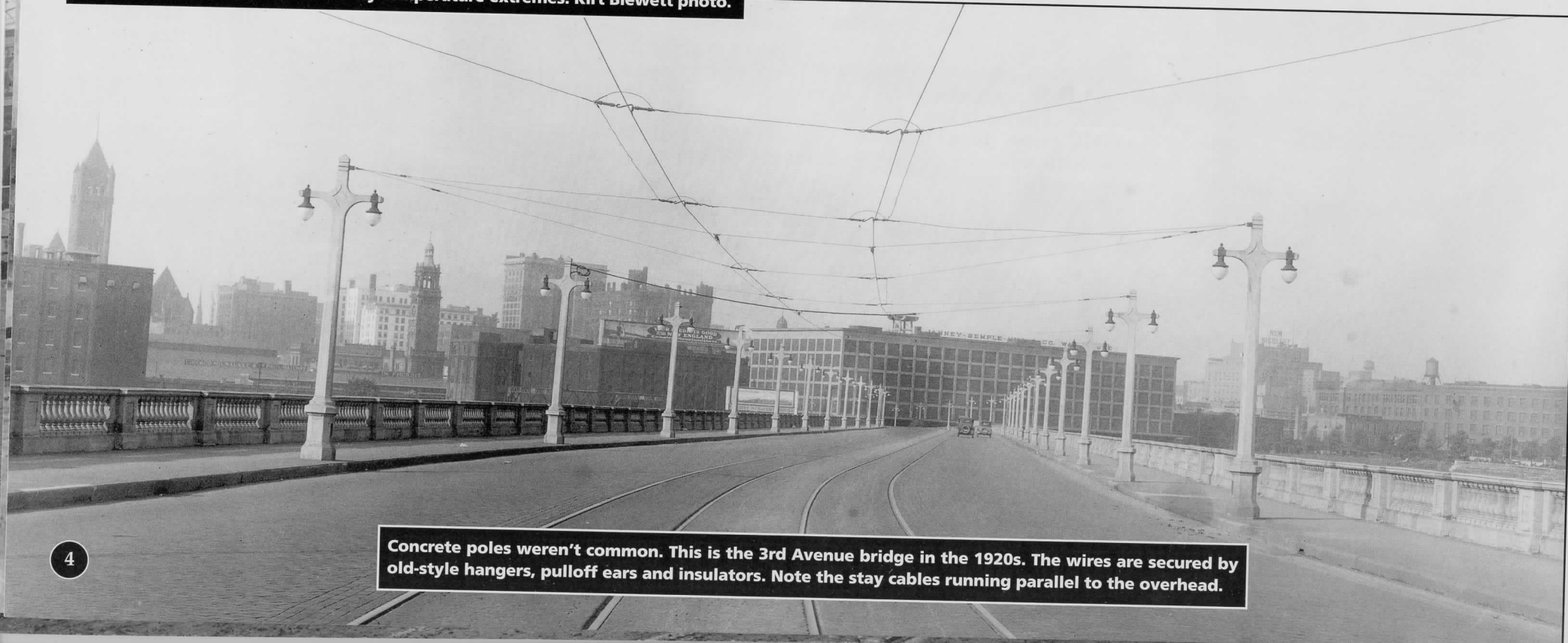
Once installed and rehabbed, the shelter will probably house some sort of displays of both its Wirth Park heritage, and the history of the original Lakewood Cemetery streetcar stop and the tracks leading to it. Because it is so spacious, it will shelter Memorial Day passengers and volunteers, and should become a useful prop for the Halloween Trolley and Holly Trolley.

CELESTIAL KNITTING

-Tom Fairbairn

The title of this article was suggested by Jim Vaitkunas. I find trolley and electric railroad overhead fascinating. As a result, I haunt any source I can find for information on the topic and scoop up any chance I have to locate pictures and drawings of this aspect of streetcar and interurban construction. The various interfaces between the trolley wire and the vehicles are equally interesting, although a very narrow field.

With the advent of the new book, "Twin Cities by Trolley," I have had a chance to get an even better view of overhead work as done by the TCRT. It differs in a number of ways from what was common where I grew up in the eastern part of the US. Those who have either the Richey "Electric Railway Handbook" or any of the ICS "Electric



Concrete poles weren't common. This is the 3rd Avenue bridge in the 1920s. The wires are secured by old-style hangers, pulloff ears and insulators. Note the stay cables running parallel to the overhead.



Single-track segments often used one overhead wire in each direction, which reduced wear and the need for a separate feeder wire. That's the case here at 50th and France Avenue. The pole at left supports three pulloffs to the curve at right, and the frog at right is stabilized by suspension cables to poles on both sides of the street. Several single-track and gauntlet sections were governed by Nachod block signals, triggered by the signal contactor at upper right. Minneapolis Public Library collection.

Railway Engineering" textbooks have excellent source materials for deeper study of typical overhead installation practices.

From its early days, TCRT overhead was very precise, very simple in design, and excellently maintained. That it worked extremely well is obvious from photographs of the TCRT cars through the years. One virtually never sees bent trolley poles, which is the mark of a line where there are frequent dewirements.

First off, TCRT did not stretch the span wires tight as was commonplace with streetcar lines elsewhere. From the photographs, it would appear that the span wires on TCRT lines drooped as much as six feet or even more between the supports and the trolley wires. That was unheard of most places. I suspect it was done to allow the trolley wire to expand and contract over the extremes of temperatures in this area with less stress on both the trolley and supports. It also reduces the noise transmitted to the public, because less tension means the cables won't conduct sound as well.

Second, TCRT used quite a variety of supporting poles. Most of us are very familiar with the iron poles TCRT fabricated at Snelling Shops. However, in the downtowns some of the overhead was supported from adjacent building walls (see inside rear cover). Some of the rosettes and eyes used for that purpose are visible to this day on older buildings. Elsewhere, TCRT



The Stillwater line poles lack guy wires, so they're canted away from the track to compensate. The near pole line carries the feeders and you can see a feeder to the overhead wrapped around the span wire. The far poles carry the company telephone wire.



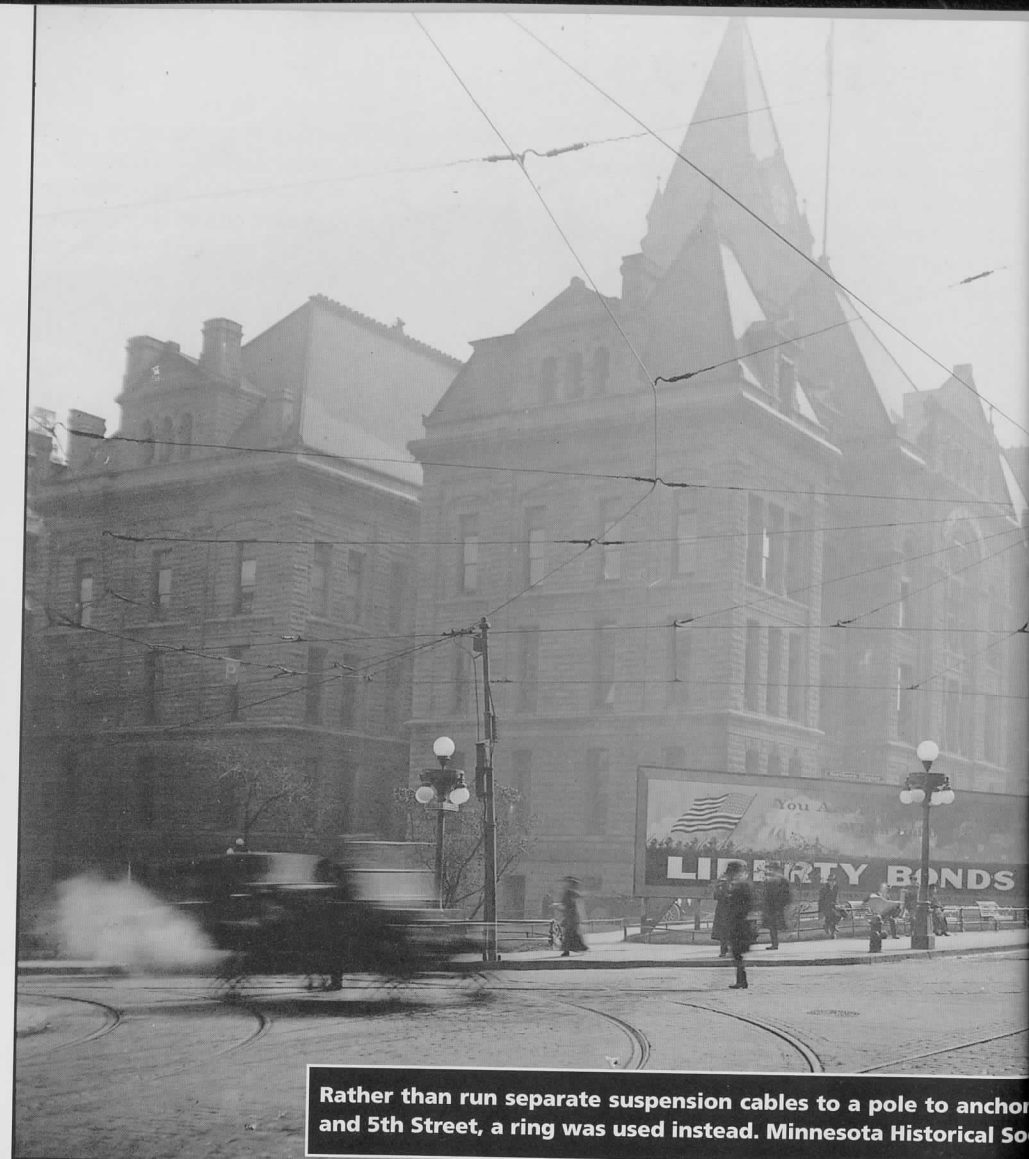
Much of the early overhead was suspended from these center poles. The feeder is the middle (topmost) wire. Almost all the center poles were replaced by side poles with span wires. A few remained until the end on the Minnehaha Park spur, the Phalen Park right of way and the Fort Snelling shuttle.

used girder frame poles, cast concrete poles, and the good old wooden poles. Some of the wooden poles had the same type of top cap with an eyebolt that TCRT used on the iron poles, but most, especially in outlying areas, did not. Surprisingly, TCRT did use wooden poles, a lot of them, in residential areas outside the Loop.

It is interesting in some photos that TCRT didn't use back-guys on all of their wooden poles. Some poles, over time, take an obvious bend toward the track. One line in South Minneapolis shows wood poles bent almost into a C-shape! TCRT was also not particularly concerned with the alignment of the poles to a common vertical alignment. That's very apparent if one looks at pictures taken along the Inter-Campus and the Stillwater rights-of-way.

There were a few areas right up to the end of service (Fort Snelling Shuttle, the Minnehaha Park spur and the Phalen Park right of way) that used the 1890s-vintage TCRT standard bracket arm poles rather than span wires. Unlike the conventional bracket arms we use here at the Museum, and that were most common elsewhere around the country, the TCRT brackets had no span wires. The insulators for the trolley ears were screwed to a clamp that went around the bracket arm, and were thus rigidly attached to the arms. Adjustment of the trolley wire over the track was accomplished by sliding the clamps one way or the other along the bracket arm.

TCRT did not believe in "backbone" or "spine" wires along curves (with some exceptions), or at turnouts. The



Rather than run separate suspension cables to a pole to anchor and 5th Street, a ring was used instead. Minnesota Historical So

pullover were attached to cables that either ran back to poles directly (see front cover) or, using "gathering rings," gathered to one cable that then went back to the pole (see above photo). In a few instances, cable attached to two adjacent poles would provide pull for one or two pullovers at the center of a curve or span where the angle of the pullover to the trolley would otherwise be too close. These generally came out to within a few feet of the trolley. At locations where there were several

diverging lines (typically street junctions between lines and at wyes) the diverging trolley wires were used to provide pullovers to each other, a standard practice (see rear cover). The pullover arrangement TCRT used both helped act as anchors for the trolley should anything go wrong within the curve, and made the task of adjusting the pullovers very direct and positive. That helped reduce the maintenance of the curved section of the trolley. TCRT's positioning of the wire over



the pulloffs at Wabasha
ety collection.

the curves was very exact.

So was their approach to wire frogs. In the photographs, there are very few "floating" frogs. For the most part, frogs had span wires that ran to opposite poles for adjustment and to prevent tilting (see front cover). If there were no opposite poles, support cables ran out from the two or four closest poles to the frog to accomplish the purpose, or they were supported by adjacent trolley wires or frogs. If the frog was fairly close to a span wire, the positioning

cables would go to the poles supporting those span wires. There were some "floating" frogs in yard ladders, where a dewirement was hardly a disaster; or where there were multi-path junctions in the track. In either case, the overhead was generally rigid enough with all the wires, pullovers, and crossing frogs involved to pretty well support the frogs in position.

Span wires and back-guys attached to wooden poles didn't use eyebolts. Where poles had the top-hat caps, there were eyebolts through the caps (attaching the span wires to the top-hats was another uncommon trait of TCRT). However, on wooden poles the cables were wrapped around the poles twice, steel guy hooks being attached to the poles so the cables could not slip down. The cable ends typically were wrapped back on themselves several turns without clamps or special windings. Generally, although the span wires drooped considerably, the pullover cables ran back to the same attachment points as the span wires, or to a point further down the pole.

Span wire insulators on TCRT are an enigma. I have found no rationale for how they were used. Sometimes the only insulators were the ones at the hanger ears, plus the top hats where they were used. In other locations Johnny Balls (the common cast ceramic compression-type insulators) were used about six feet out from either side of the trolley, or sometimes nearly at the poles. Sometimes they were used between parallel trolley wires, sometimes not. Whatever, they were usually installed symmetrically. Earlier on, TCRT installed a lot of overhead using what are called "strain insulators," two eye fittings separated by about a foot of hardwood rod that had been boiled in paraffin (see rear cover).

Another thing I have not often seen elsewhere is the use of Johnny Balls or strain insulators tied directly to pullovers and hangers, rather than



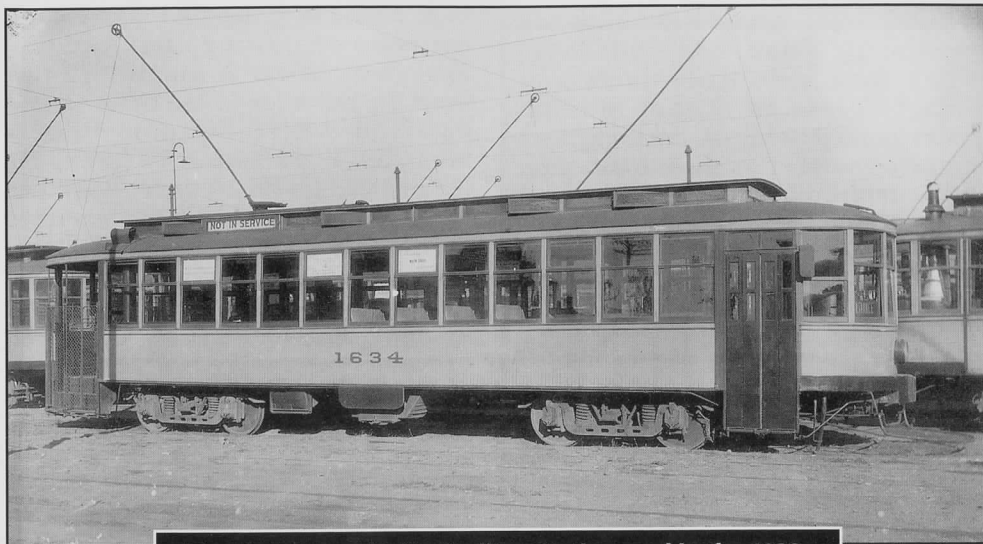
About the enter the Como-Harriet line from single track Inter-Campus line, a car passes a signal relay box on the pole and a signal contactor on the wire. Sandy Goodrick photo.



The single track Robbinsdale line had paired one-way overhead wires and no separate feeder. The camera looks southeast on Broadway at Oakdale.



The west end of the Snelling Station yard shows the modern hangers, pulloff brackets and "Johnny-ball" insulators. Minnesota Historical Society collection.



Old-style hangers in the Snelling Station yard in the 1920s.

spaced away from the trolley wire. This had the ill effects of endangering the insulators should a pole dewire, and creating an electrical hazard for work crews with a potentially-grounded span wire that close to the live trolley. Nevertheless, it was the most-used insulating arrangement on TCRT overhead.

TCRT used mostly soldered trolley wire ears, especially after moving to the round wire from the previous figure-of-eight. They were a good bit different from the bolted clamps used a lot today. Old pictures of the TCRT show a unique trolley hanger that consisted of a 1-1/2 inch square maple insulator about a foot long that had been boiled in paraffin. An ear casting attached to each end supported the trolley wire, and a center hanger attached to the span wire with what were called "sister hooks," or fastened to the bracket arm clamp. Both were held to the maple bar with cotter pins. These were something the TCRT manufactured. I've never seen anything like these in any pictures taken elsewhere.

Nor have I ever run across some of the other unique pullovers and related hardware the TCRT used at one time or

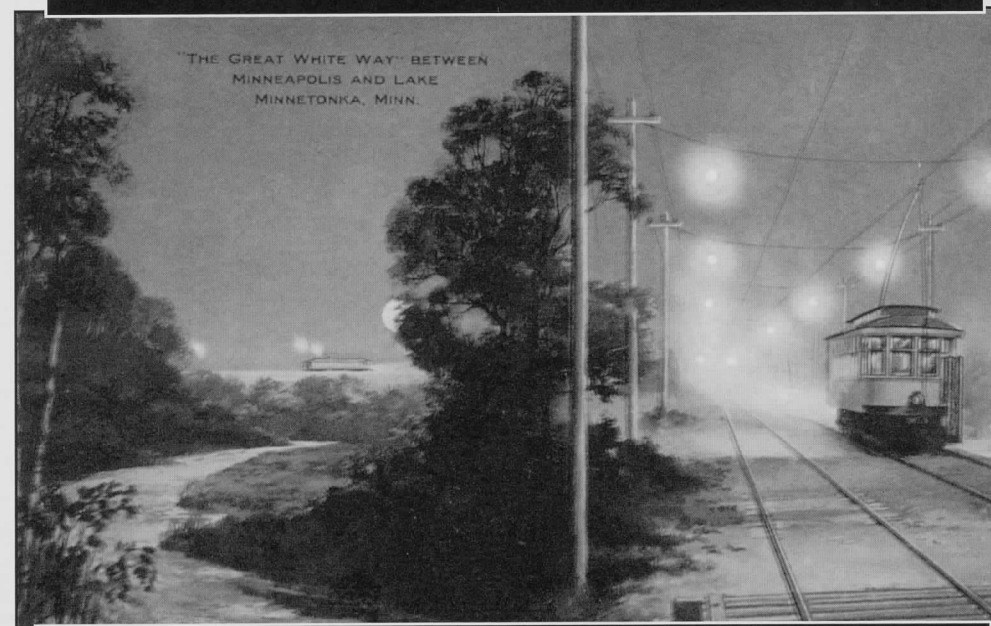
another. The pullovers looked much like large buttonhooks or gaff hooks, and had strain insulators attached to one or both ends. TCRT called them "insulated pullovers." These and the unique hangers disappeared as the TCRT replaced the #2/0 figure-of-eight trolley wire they first used with #3/0 round wire; they purchased standard Ohio Brass fittings for the latter.

TCRT used a home-designed switch frog early on, having a divergence angle of 12.5 degrees, and mounted them nearly over the switch points. These frogs were of a simple pan shape, with a flat running surface within the frog. They used these throughout their operation with the large trolley wheels that were a characteristic of their cars. Other lines went to sliding shoes and to a different type of frog, located well behind the switch points about 1/3 of the way to the rail frog.

TCRT was also, in common with other operators, not especially concerned about wire heights. They would vary from 16 to 20 feet along most parts of the line, down to around 13 feet or even less under some bridges. An easy way to gauge how



Between 36th Street and the Lakewood Cemetery stop, a Como-Harriet car passes an automatic circuit breaker for the line feeder. In the event of a downed wire or other short, the circuit breaker would isolate this section. Kirt Blewett photo.



From 34th Street to Excelsior, TCRT hung DC arc lights that were powered off the overhead, creating the "Great White Way" that was glamorized in this postcard.

THE MOTORMAN'S GRIP

Trip sheet

There was more to being a streetcar trainman than just running the car. You had to account for all passengers, breaking them down by the trip and type of fare paid. All transfers issued had to be logged, down to the serial number series. The trip sheet shown here dates from the 1910-1919 era. It is specific to the Fort Snelling-Minnehaha interurban, that traveled from Minneapolis to Fort Snelling via Minnehaha Avenue, then continued to downtown St. Paul via west 7th Street and through to Hazel Park on the East Side via East 7th Street. Note that the passenger count had to be broken down by Minneapolis, West 7th and East 7th segments.

Form 310. 50,000 7-11.



**TRANSFERS
ISSUED**

Series No. _____

Ending No. _____

Commencing No. _____

Total _____

Punch Mark _____

Snelling - Minnehaha Line

Relieved by _____ DATE _____ 191 _____ Motor No. _____

Conductor No. _____

CASH FARES										TICKETS AND TRANSFERS									
... Register at Ending ...																			
Register at Commencing																			
... Fares Registered ...																			
CASH.. } Totals { Tickets & Transfers																			
Cash Received. CLERK																			

TRIPS	Time Card Time	ACTUAL TIME	EAST 7th STREET			LOAD	WEST 7th STREET			LOAD	MINNEAPOLIS			LOAD	TOTAL FARES		Trans fers Issued	SPECIAL	TRIPS	
			FREE FARES	CASH FARES	Tickets & Trans		FREE FARES	CASH FARES	Tickets & Trans		FREE FARES	CASH FARES	Tickets & Trans		CASH	Tickets & Trans			FROM	TO
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0																				
1																				
0																				
1																				
0																				
TOTAL																				

I hereby certify that line, date, time, trips and runs as shown above are correct.

RUN No. _____

WRITE REMARKS ON BACK.

I hereby certify that all information shown above is correct.

Motorman No. _____

Conductor No. _____

high a wire is suspended is to look at the poles on passing cars. A typical heavyweight car is roughly 12 feet from the railheads to the trolley board or stand where the pole base is mounted. If the wire is 19 feet above the railhead (standard dimension) then a 14-foot trolley pole (also standard dimension) will run at a slope of right around 45 degrees. If the slope is less, the wire is lower. At 30 degrees, for example, the wire is about 15 to 16 feet above the railheads. At 60 degrees, it's about 21 feet (rough figures, but close enough for our guesstimating needs).

If anyone is interested we can do more articles on this topic, and include engineering equations and field methods for setting up overhead. Other than the height of the supports to arrive at a specific trolley height, it works a good bit the same way for catenary. Where pantographs are used, the pullovers on curves are less frequent and less critical, and no frogs are needed, but other basic information still applies.

I'm indebted to several sources for this information. Locally, thanks to Aaron Isaacs, who put me in touch with other contributors and sources. I appreciate everyone's assistance.

THE RULEBOOK

Bell signals

All MSM operators at Lake Harriet and Excelsior are familiar with the code of two bells to go forward and three bells to back up. Back in TCRT days, the use of bell signals between the motorman and conductor was much more complex. What follows are excerpts from the company's 1917 "Operating Rules for the Government of Trainmen".

Rule 48 Bell Signal Code

The following code of signals shall be used in the operation of Cars:

(a) From conductor to motorman:

1 bell-"Make passenger stop immediately," or if electric bells (buttons on window posts used by passengers to request a stop) are out of order, "Stop next regular passenger stop." This signal when Car is backing shall mean "Stop immediately." If given when Car is standing, this signal shall mean "Open gates immediately."

2 bells-"Go ahead."

3 bells-Given when Car is standing, "Back Slowly." This signal given when Car is moving forward shall mean "Stop immediately."

4 bells-Under certain circumstances this signal shall be used to advise motorman to make only every other stop.

5 belts-This signal may be given in an emergency when Car is standing still, indicating the motorman that he shall start Car forward immediately. The use of this signal is intended to be reserved entirely for emergencies such as to avoid a collision with a following Car on the same track which has gotten beyond control of the motorman.

(b) From motorman to conductor:

1 bell-"Come to front vestibule."

2 bells-"Watch trolley."

3 bells-This signal shall indicate that motorman wishes to back Car slowly, and shall be answered by conductor by a similar signal of "three bells," if the track behind is clear so that it is safe to back Car.

4 bells-Warning "Get ready to pull trolley down to roof."

In cases where conductor observes that passengers are being carried beyond their destination, either because the electric signal bell has failed to operate or because motorman

has failed to observe same, he shall give the "one bell" signal and motorman shall obey such signal without indicating any ill feeling toward the conductor or without taking offense at its use.

Rule 49 Backing Car

When Car is standing and motorman for any reason desires to back Car, he shall give conductor "three bells," but Car shall not be moved until curtain in the bulkhead has been raised and conductor has answered with "three bells" to signify "All is clear behind."

Motorman shall be responsible for raising front curtain before Car is backed. If bulkhead has no door, he shall see that conductor raises curtain.

Rule 50 "Ready to Start" Signal from Motorman

Whenever a Car is stopped and gates opened, motorman shall, as soon as he is ready to go forward, give two taps of his gong, after which, if ready to proceed, conductor shall give the regular "Go ahead" signal of "two bells."

Whenever conductor gives signal for Car to proceed, and for any cause whatever motorman is not ready to start Car, motorman shall allow gates to remain open and, when ready to proceed, shall give two taps of the gong and wait until conductor has again given the "two bell" signal for Car to proceed before closing gates. See also in this connection Rule No. 94 covering stops and safety zones.

Rule 51 Passing Under Overhead Construction

After having come to a full stop before going under an overhead obstruction ("four bells" having been given by motorman as a warning to conductor and "two bells" having been received in answer), the Car shall be given a sufficient start to carry it past the obstruction, and current shall then

be shut off and two taps of the gong given to conductor to pull down trolley. On the opposite side of the obstruction, motorman shall not put on current, but shall let Car drift until he receives "two bells" from conductor signifying that trolley has been replaced on the wire.

Rule 76 Maximum Load

During the hours 5 A.M. to 8:30 A.M., 11:30 A.M. to 2 P.M. and 4:30 P.M. to 6:30 P.M., the following procedure shall be followed on Cars in Minneapolis: Conductor shall keep close count of the passengers boarding and alighting, and when Car has obtained a full load he shall announce to other passengers who may be waiting to board Car, "Car is full; please take the next Car," and after giving two bells to start Car shall give motorman a further signal of two bells, after which no stop shall be made to receive passengers until the load has been reduced by passengers alighting.

Rule 78 Opening Gates at Other Than Regular Stopping Places

When Car is brought to a stand-still at some point on the line which is not a regular stopping place to receive or discharge passengers, motorman shall not open gates until he receives an overhead bell signal from conductor signifying that it is safe for passengers to alight. It shall be the duty of conductor immediately to give the overhead bell signal to open the gates so that passengers may alight, providing conditions are such that they can leave Car without danger of being run down by passing vehicles. Otherwise conductor shall not give overhead signal to open gates until conditions are such that passengers can alight in safety.

Rule 129 Use of Overhead Bell

It shall be the duty of the conductor to give one overhead bell under the following circumstances:

(a) When the electric bell is out of order.

(b) When electric bell signal, properly given by the passenger, is not heeded by the motorman.

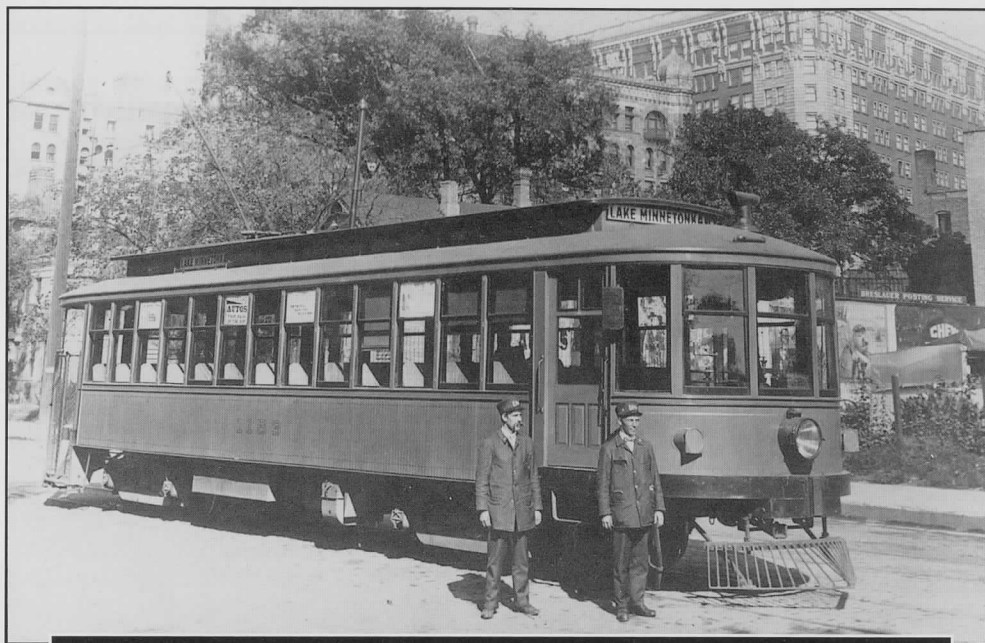
(c) When a passenger suddenly decides to alight, providing Car has not proceeded further than one Car length beyond stopping place.

(d) When conductor observes a person desiring to board, providing Car has not proceeded further than one Car length beyond stopping place.

A passenger has a legal right to ring the overhead bell for Car to stop and the exercise of this right shall call forth no reprimand from the conductor.

Conductor shall not use the rear overhead bell to hurry passengers on or off Car. A polite "All aboard" or "Use all gates, please," is sufficient.

No. _____
OPERATING RULES
FOR THE GOVERNMENT OF TRAINMEN
MINNEAPOLIS STREET RAILWAY COMPANY THE SAINT PAUL CITY RAILWAY COMPANY THE MINNEAPOLIS AND ST. PAUL SUBURBAN RAILROAD COMPANY
Revised and Reissued September 15, 1917
MINNEAPOLIS TELEPHONES. N. W. Main 4580 T. S. 34 580
ST. PAUL TELEPHONES: N. W. Jackson 2600 T. S. 23 173
THIS BOOK IS THE PROPERTY OF

Prior to 1920 the high-speeds shared the same silver pin-striping and outlined numbers as the rest of the fleet. Lake Minnetonka car 1153 is laying over between trips in downtown Minneapolis on 1st Avenue North between 6th and 7th Streets. We don't know the location of the White Bear car at right. Note the run number in the upper front window.

TCRT's INTERURBANS: *The High-speed Suburban Cars*

-Russell Olson and Aaron Isaacs

When TCRT built its Lake Minnetonka extension in 1905, it simultaneously built a new class of car that was specifically designed for the heavily-engineered high-speed line. Although they shared the well-established Twin Cities carbody design, cars 1112-1123 were a different animal, effectively they were interurbans. They were the first steel underframed cars, and faster than anything the company had built. Their G.E. 73 75-horsepower motors had half again as much power as any other cars, and were geared for 60 miles per hour. The older cars up to that time had 40-horsepower motors geared for 26

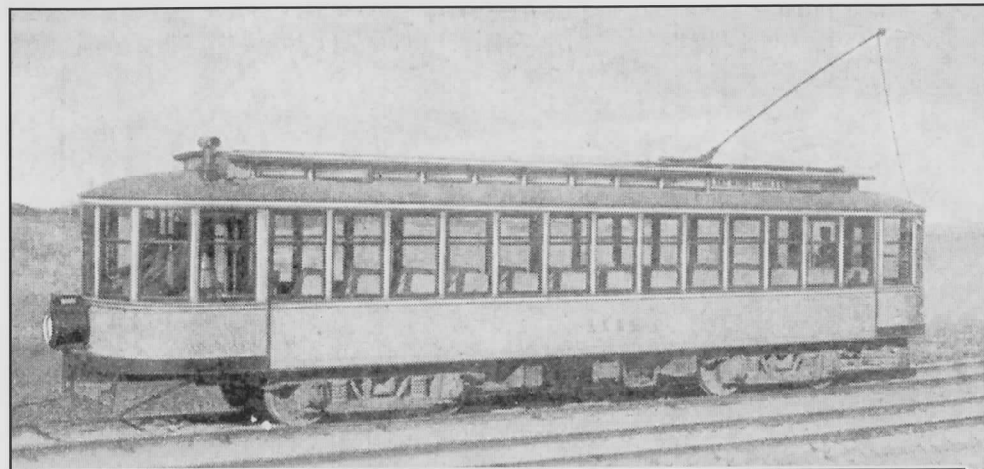
m.p.h., or 50-horsepower motors geared for 37 m.p.h. (those with field shunts increased the speed to 42 m.p.h.).

They differed from the standard city cars in a number of details. Their seats were all transverse (forward facing). Instead of fenders, they sported railroad-type pilots. For operation on single track, the fast cars later had electric classification lights installed on their front dashes replacing the marker brackets that held colored metal paddles. A train number target was displayed at the top of the left front window.

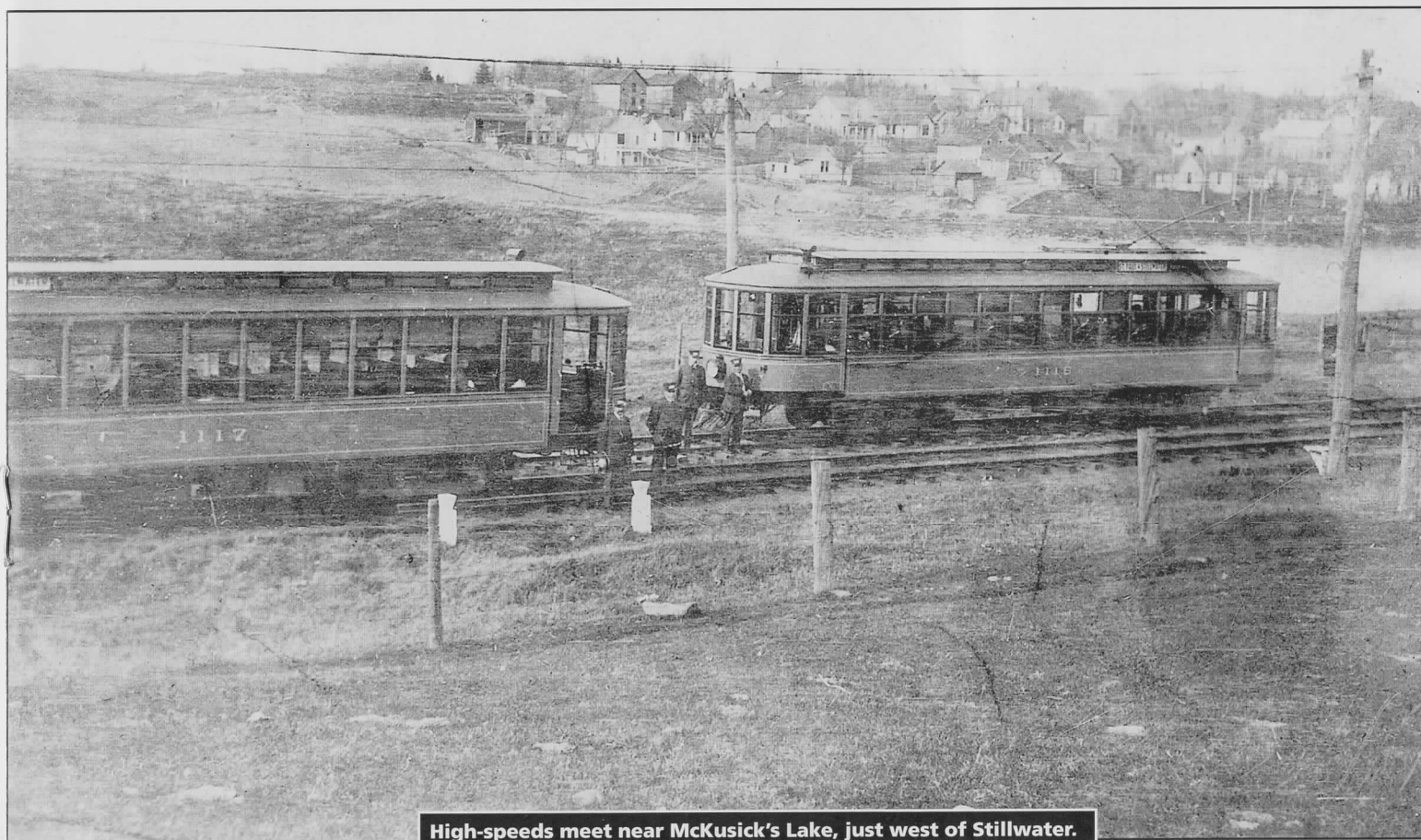
There is a misconception that high-speed suburban cars appeared all at once and handled the entire Stillwater and Minnetonka base service. Their history is much more complex.

The Stillwater line opened during 1899 with service provided by seven





Left: The Stillwater cars received pilot plows in the winter. No photos of similar plows on the Minnetonka line have surfaced. Above: The first high speeds entered service without steel pilots or classification lights.

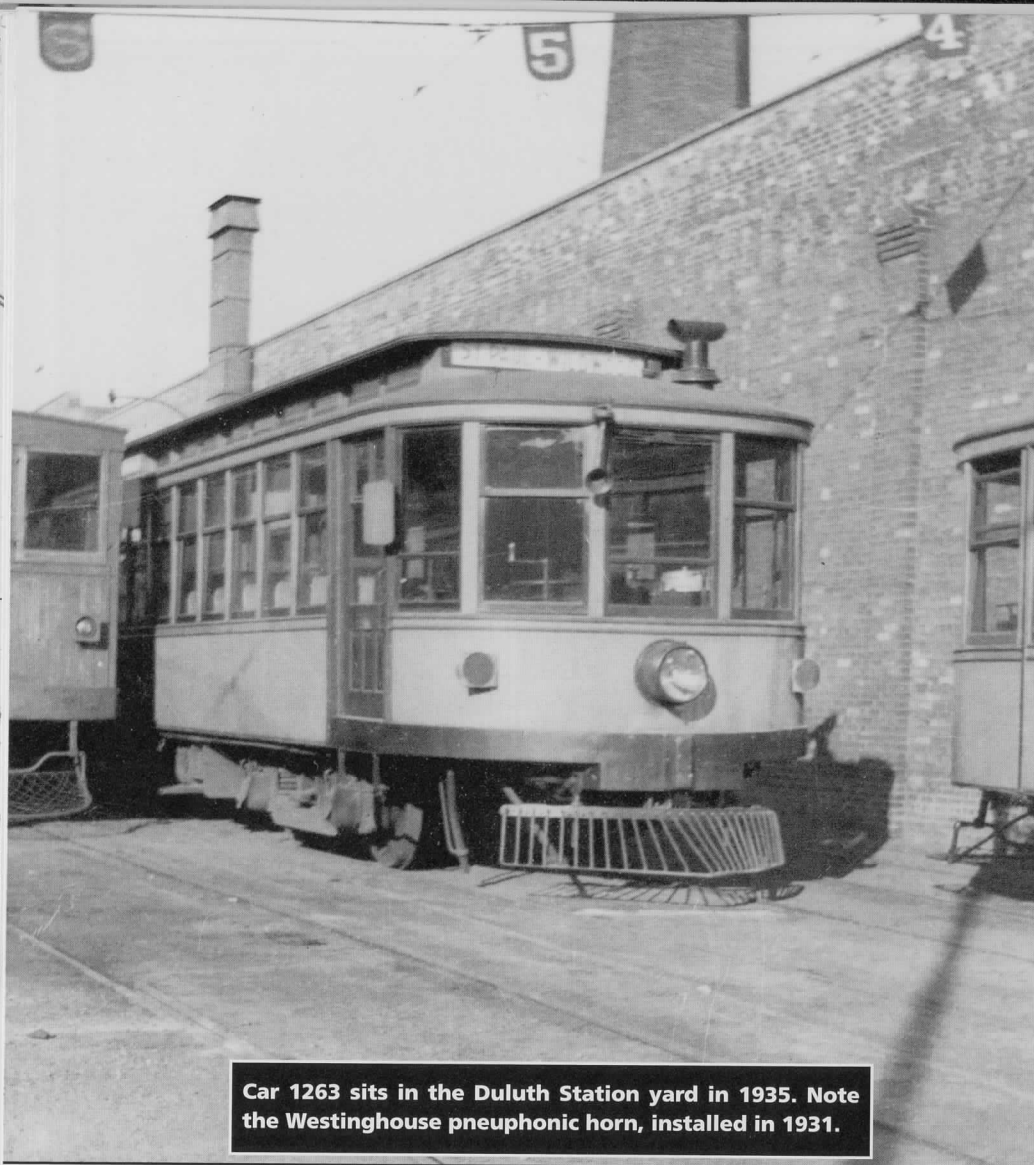


High-speeds meet near McKusick's Lake, just west of Stillwater.

newly-built cars equipped with Brill trucks, two G.E. 57 motors (50 h.p.), K-11 controllers and airbrakes (the first cars with airbrakes). During 1901 they were upgraded with Twin City trucks, four G.E. 57 motors and K-14 controllers. They were geared 28:57 for a top speed of 44 miles per hour. During 1902 four G.E. 73 motors (75 h.p.) were installed on the Twin City trucks of seven cars, 779-785. However these motors were returned to G.E. later in 1902 so these seven cars received the motors and controllers from the original seven cars.

During 1904-1905 additional suburban cars were needed for increased service and the opening of the White Bear line so six cars, 773-778, received 4 G.E. 57 motors on their Twin City trucks together with K-14 controllers. Cars 773-785 remained in Stillwater service until 1909-1910 when the first high-speed suburban cars were assigned there. Cars 779-785 were the last to be used, probably until 1911-1912.

The first high-speed suburban cars, 1112-1123, were built in 1905 for the opening of the Lake Minnetonka line.



Car 1263 sits in the Duluth Station yard in 1935. Note the Westinghouse pneuphonic horn, installed in 1931.

All were equipped with Baldwin trucks, 4 G.E. 73 motors, and Type M control with C-6 master controllers. These cars were geared 24:51 for 60+ miles per hour.

The history of the high-speed suburban cars is intertwined with that of the experimental double deck cars. In 1904, car 1092 was built with an unenclosed upper deck. In 1906 car 1145 was built with an enclosed upper deck and had the same mechanical and electrical equipment as 1112-1123.

It was followed by an order of 50 cars, 1146-1195, identical in construction to 1145, of which 30 cars were to be built with enclosed upper decks. All 50 cars were equipped with Baldwin trucks, four G.E. 87 motors (60 h.p.), and Type M control with C-38 master controllers. Only one car, 1160, was double decked, apparently receiving the unenclosed upper deck from car 1092. The double deck experiment was unsuccessful and 1145 and 1160 were converted back to conventional single deck cars (1145



Two of the high-speeds were destroyed in 1920. Car 1114 derailed and rolled over on St. Paul's east side. St. Paul Pioneer Press photo.



The abandonment of the Stillwater and Lake Minnetonka lines in 1932 idled some of the high-speeds, and they sat idle and deteriorating. Car 1145, built as an experimental double decker, spends its last few months in the North Side Station yard, before being scrapped in 1938.



On April 12, 1938, high-speeds are burned at Snelling Shops. St. Paul Pioneer Press photo.

probably during 1908). Some of the 50 cars were intended for the Selby-Lake line, geared for 35 m.p.h. Others were to have still faster gearing for Sunday service (two-minute headway) on the Lake Minnetonka line.

Apparently the G.E. 87 motors were not adequate to the task. So in 1907 cars 1260-1265 from an order of 20 cars being built were equipped as high-speed suburban cars with Baldwin trucks, four G.E. 73 motors and Type M control with C-6 master controllers. These cars were assigned to the Lake Minnetonka Division and geared 24:51

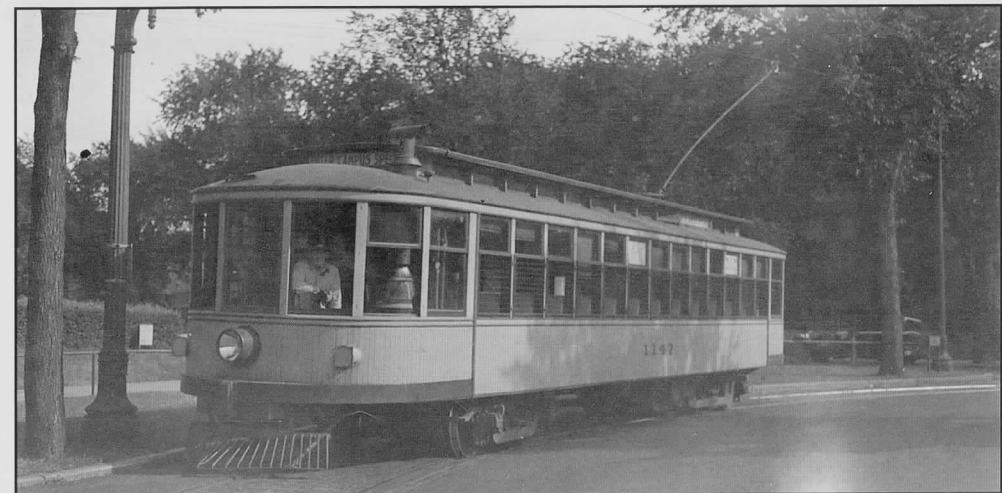
for 60+ miles per hour.

All the G.E. 87 motors proved to be unsatisfactory and were returned to G.E. during 1909. At this time the decision was made to equip 1145-1163 as high-speed suburban cars with Baldwin trucks, four G.E. 73 motors, and Type M control with C-6 master controllers; 1164-1195 received Baldwin trucks, four G.E. 216 motors and K-37 controllers.

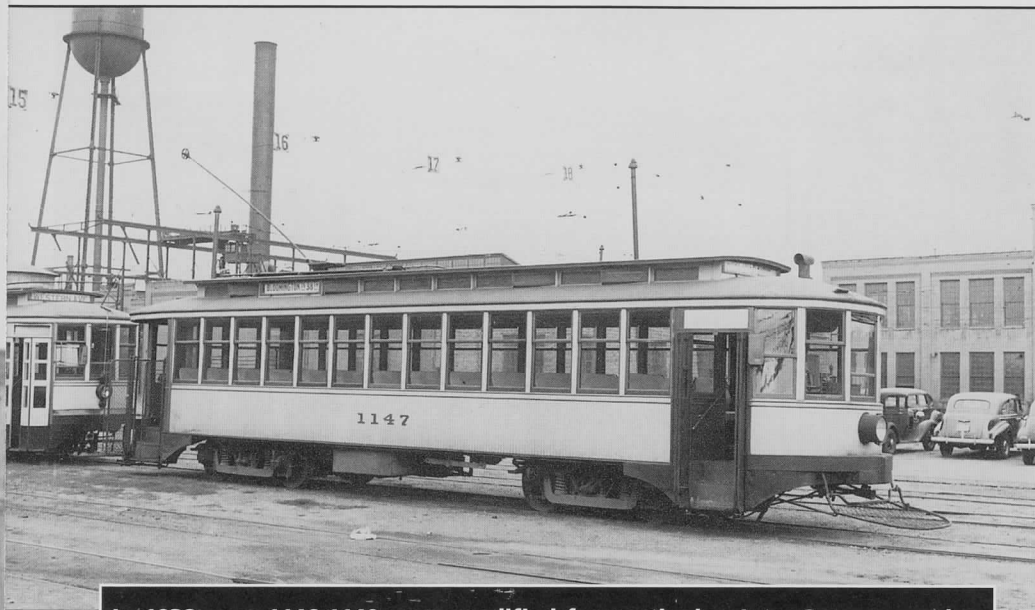
Between the big motors and the heavy-duty bodies, 1145-1163 were the heaviest cars built by TCRT, weighing in at 60,400 pounds. In contrast, car 1300 is 47,800 pounds and when the last standard cars were built in 1917, they weighed only 41,700 pounds. Cars 1145-1163 were assigned to both the Lake Minnetonka and Stillwater Divisions. Due to the steep hills in Stillwater, their suburban cars were geared 21:54 for 50+ miles per hour.

Streetcar motors

Motor	HP	Motor	HP
67	40	203	50
70	40	213	50
73	75	216	50
87	60	258	25
200	40		



During the 1930s, six of the high-speeds, minus their big motors, were assigned to the Inter-Campus line. Car 1147 is at the Minneapolis campus loop (top). By this time in 1937 it was one of the last cars to keep its heater in the front platform. The rest of the fleet had their heaters amidships on the right side with the exhaust stack in the right rear. Horses were not usually carried, but this photo at the St. Paul campus loop shows that the car also retained its double-stream rear gates when all the other gate cars had gone triple-stream.



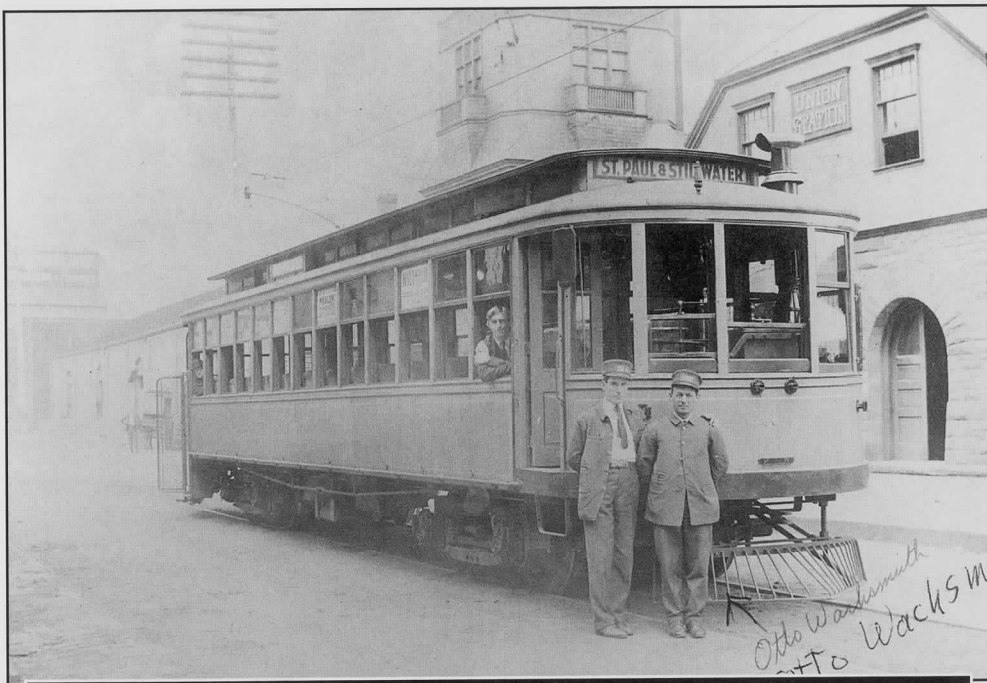
In 1938, cars 1146-1149 were modified for continuing Inter-Campus service. They received front exits, and lost their classification lights. Conventional fenders replaced the pilots. However, they retained their front stoves and all seats facing forward. They were scrapped in 1941.



The last high-speed to survive was #1261, converted to rail grinder #96 in 1938. It lasted until 1952.



Inter-Campus conductor "Skipper" Spence punches the tickets of well-dressed students aboard one of the former high speeds. Note that all the seats face forward.



Steel pilots and marker brackets first appeared on the 773-785 series of 1899-built cars that preceded the high-speeds on the Stillwater line. For awhile in 1902, some of these cars were given 75 horsepower GE73 motors. They were soon removed, to reappear in the 1905 high-speeds.

The summer 1910 high-speed suburban car assignments were: Lake Minnetonka Division 1112-1123, 1145-1148, 1260-1265; Stillwater Division 1149-1163.

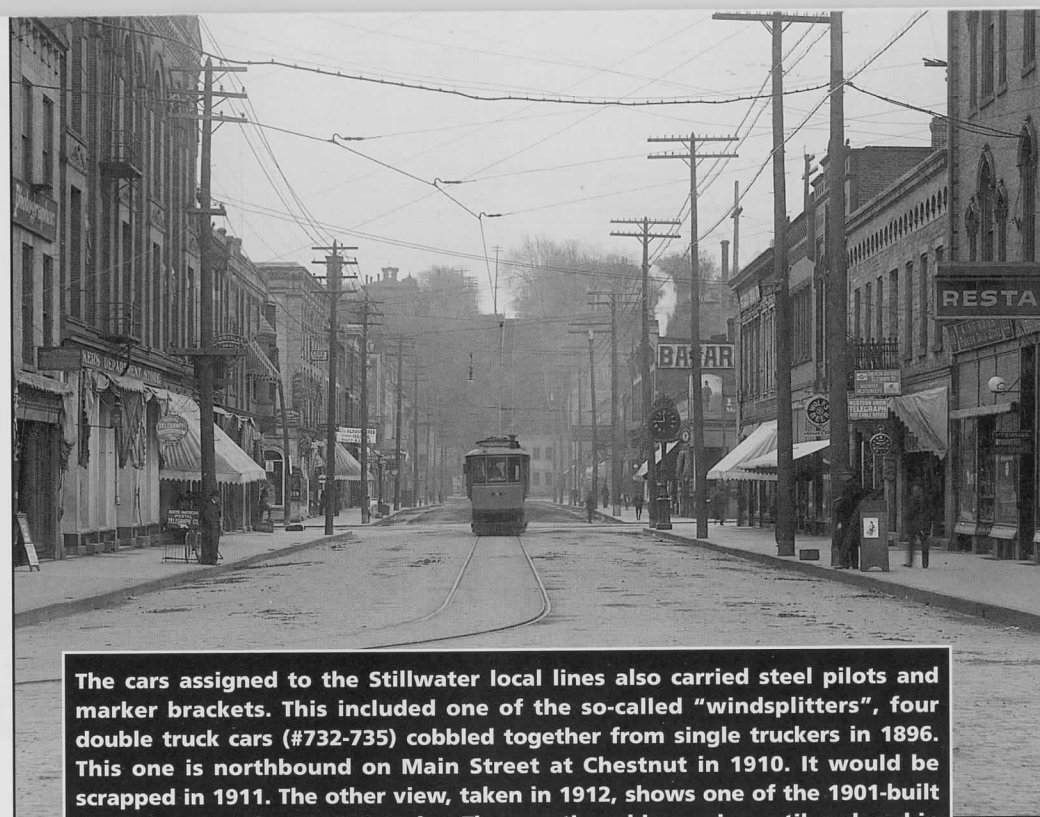
The last group, cars 1255-1259 built during 1907, were converted to high-speed suburban cars in 1914. These cars had Baldwin trucks, four G.E. 73 motors, and Type M control with C-6 master controllers.

After the high-speed suburban car fleet reached its peak of 42 cars in 1914, it was split evenly between E. 7th St. (later Duluth) Station, which operated the Stillwater Division, and East Side Station, which operated the Lake Minnetonka Division. January 1, 1916 car assignments were: East Side Station 1122-1123, 1145-1163; E. 7th St. Station 1112-1121, 1255-1265.

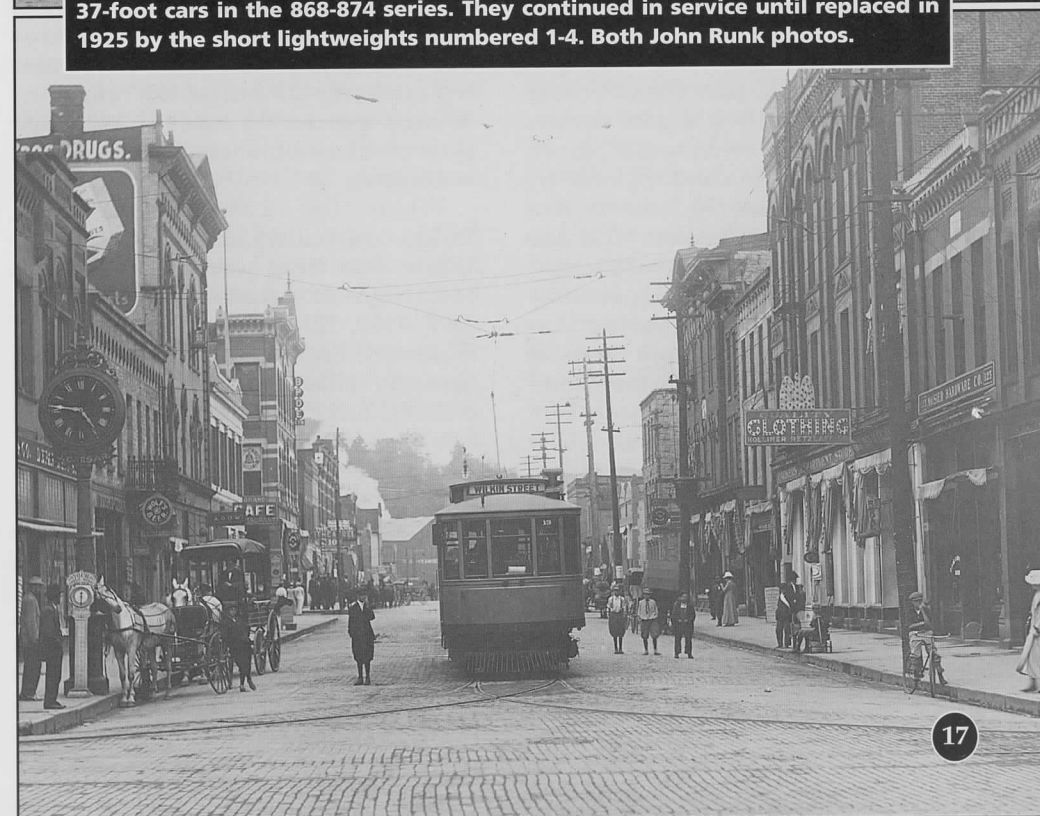
From 1920 until the end of Stillwater service in 1932, one or two suburban

cars (1265 or 1264-1265) also were kept at Owen Street Station in Stillwater, the small carhouse that housed the Stillwater local cars. On both the Stillwater and Lake Minnetonka lines, ridership was much higher in the summer and the high-speed suburban cars were supplemented by a pool of the faster local cars. Those that worked the Stillwater Division received the front dash marker brackets required for single track operation. The Lake Minnetonka Division extra cars were restricted to the double track Minneapolis-Excelsior line, where no markers were needed. MSM's own #1300 wore brackets for awhile as a front-exit gate car when it was assigned to Duluth Avenue Station with 1289-1332 for St. Paul-Wildwood service on the Stillwater Division.

Since the Minnetonka line ran far more summer than winter service,



The cars assigned to the Stillwater local lines also carried steel pilots and marker brackets. This included one of the so-called "windsplitters", four double truck cars (#732-735) cobbled together from single truckers in 1896. This one is northbound on Main Street at Chestnut in 1910. It would be scrapped in 1911. The other view, taken in 1912, shows one of the 1901-built 37-foot cars in the 868-874 series. They continued in service until replaced in 1925 by the short lightweights numbered 1-4. Both John Runk photos.

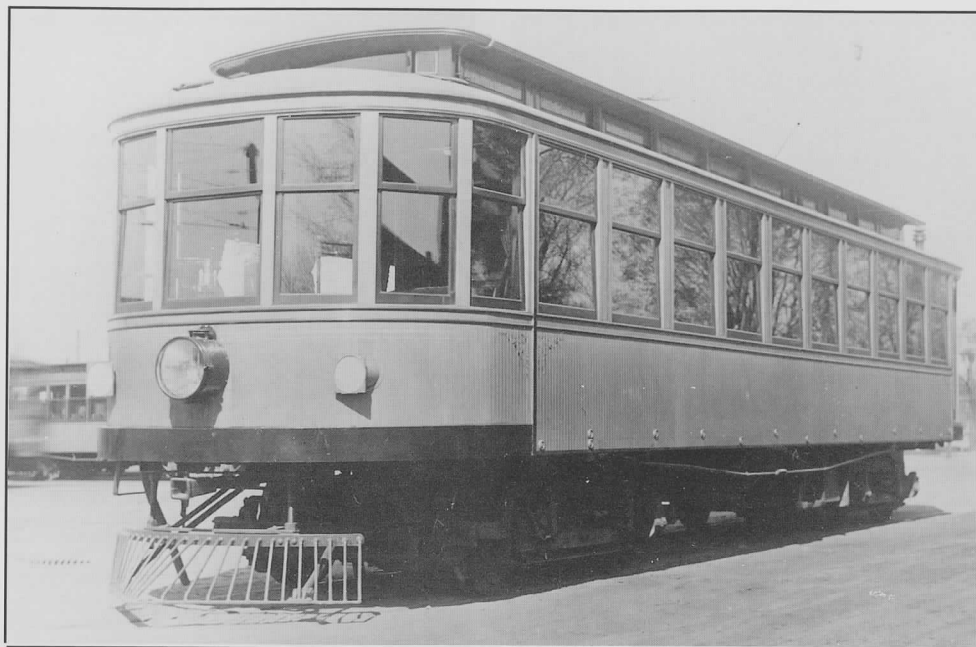




Work car #11 was assigned to the Stillwater line, and work car #12 to Lake Minnetonka, so both received pilots and classification lights. Pictured here at Snelling in 1939, #11 still had them.

some of the suburban cars became surplus in winter. Their trucks, motors and control equipment were placed under the snow plows and replaced by trucks with smaller 50 horsepower motors and K type controllers. This was a complicated arrangement that changed from year to year as additional snow plows were built. The gearing was changed to 17:73 for maximum power at low speed. Beginning in 1912, the "slow" heavy suburban cars, underpowered for the winter with smaller motors, saw some service on the lightly traveled Rondo & Maria (St. Paul) and Kenwood & Johnson (Minneapolis) lines.

Two of the suburban cars were wrecked in 1920. Car 1114 derailed and rolled into a ditch on East 7th Street at Barclay St. Car 1258 was destroyed by a hot water heater fire in the Duluth Station yard.



Thomas Lowry's private car, built in 1898, received its pilot and class lights in 1908.

Ridership on the Stillwater and Lake Minnetonka lines peaked at 11 million in 1921, then declined steadily to under 5 million in 1929. Service was reduced accordingly, so the 1930 schedules required only 24 cars of the remaining 40 high speeds. The other 16 kept their slow motors, but where they were used is unclear.

When the Lake Minnetonka, Wildwood-Stillwater and Wildwood-White Bear lines were abandoned in 1932, eight of the suburban cars (1116, 1117, 1119, 1257, 1260-1263) continued in service on the St. Paul-Mahtomedi line. By 1934 that group had been reduced to 1257 and 1260-1263, and all five were retired in 1935.

Cars 1146-1149 became regulars on the Inter-Campus line, with 1160 and 1265 as spares. 1160 and 1265 were retired in 1935. The remaining suburban cars were stored at Snelling, Lake Street and North Side Stations. Only car 1113 was returned to Mahtomedi service for awhile, but by 1936 it had joined 11 sisters in storage at North Side Station.

In 1938, Inter-Campus cars 1146-1149, equipped with small motors since 1932, were rebuilt with front exit doors for the Inter-Campus. Their pilots were replaced by regular fenders and the classification lights were removed, but the all-transverse seating remained. They ran until 1941, when they were scrapped.

The other high-speeds, stored since 1932, were finally scrapped in 1938 and 1939. Only #1261 escaped, being converted into a rail grinder in 1938. Since work equipment ran as unscheduled extras, its classification lights were retained, but the interior was stripped and it was painted the standard work car red (Glidden Red Freight Car Paint). Renumbered #96, it remained in service until scrapped in 1952.

Pilots

Although we associate pilots and classification lights with the high-speed suburban cars, they were initially built without them. Cars 1112-1123 had only fenders and large arc



Car 1419, shown in its 1910 builders photo, was part of the pool of regular streetcars assigned to the Stillwater line, so it carried marker brackets for operation on single track.

headlights, as did 773-785. The railroad-style steel pilots were introduced in September 1906 on car 1112. The pilots were installed on an additional 27 cars beginning in December 1906, including 773-785. (Photo 29) Cars 1159 and 1160 didn't receive them until June 1908.

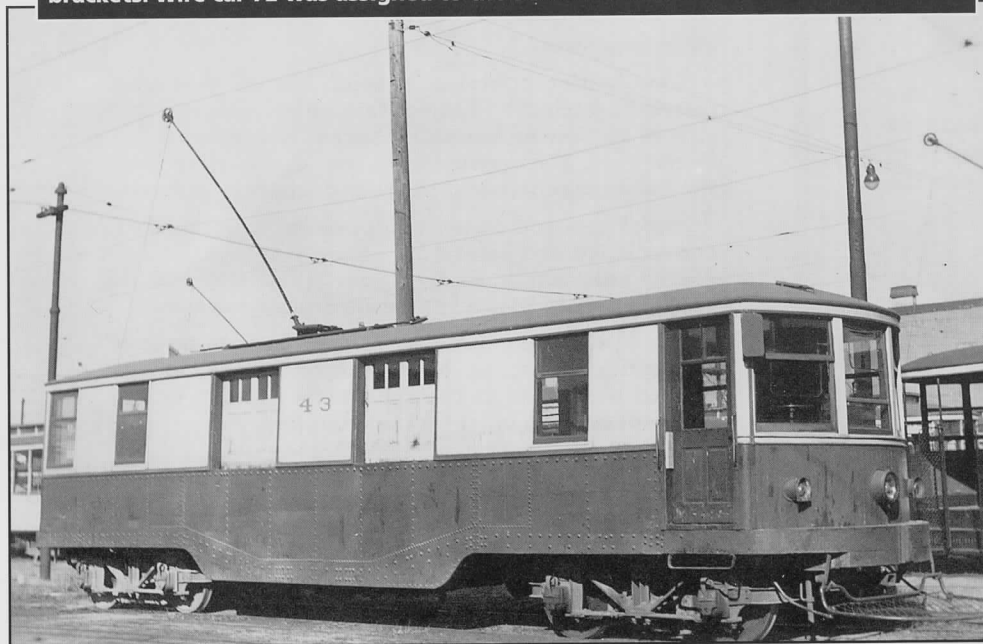
Thomas Lowry's Private Car received a pilot in 1908. Pilots appeared on other pieces of less exalted rolling stock. The Stillwater Local cars 733 and 868-874 had them. They also appeared on the Stillwater Division and Minnetonka Division non-passenger equipment, including Baggage Car #34 and Work Cars #11 and 12. The University of Minnesota's Switch Car had a steel pilot.

Marker Brackets

Every car that regularly operated outside the city limits of Minneapolis and St. Paul was treated as a train and, like their steam railroad counterparts,



Many of the work cars such as sand car #43 sported either class lights or marker brackets. Wire car 72 was assigned to the Stillwater division.



Probably the last piece of equipment to receive a railroad-style pilot was the University of Minnesota switch car, built at Snelling in 1914.

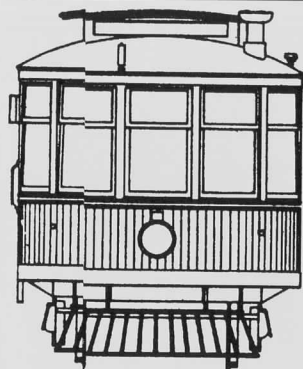
was expected to carry an indication that there were additional following sections of a scheduled train, or an unscheduled movement.

On the Stillwater Division, as of 1906 they displayed colored cards in the window reading: "No Car Following" (white), "Car Following" (Green) or "Extra" (red).

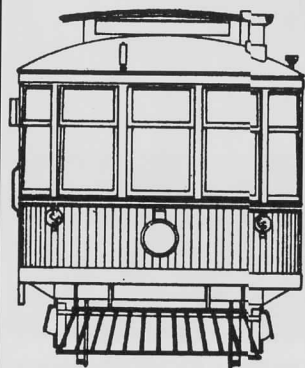
Marker brackets were first mentioned in a shop work order dated May 1908 and titled "side lights and brackets". These were brackets installed on the front dash that could hold metal targets (paddles) by day, and oil classification lamps (lights) by night. The targets were metal, round, painted green (section following) on one side and white (extra train) on the other. 21 cars on the Lake Minnetonka Div. and 17 cars on the Stillwater Div. were to receive them that year (including 773-785). On the high-speed suburban cars they were replaced by electric classification lights beginning in 1910.

As to the Lake Minnetonka Division we know that 1370-1386 later received marker brackets specifically for service on the Lake Minnetonka line. However as of 1919 Minneapolis cars with 50 h.p. motors assigned to East Side and Lake St. Stations, and all cars at Nicollet and North Side Stations had "Lake Minnetonka" destination signs, yet they did not receive marker brackets as they were operated as Excelsior Limiteds only, all on double track.

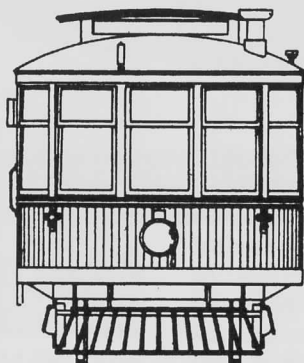
On the single-track Stillwater Division all cars that could be used in St. Paul-Wildwood service were fitted with them. As of 1919 St. Paul cars with 50 horsepower motors assigned to Snelling Station and all cars at Duluth Ave. Station (E. 7th St. Station renamed) had "St. Paul-Wildwood" destination signs. (In addition all Duluth Ave. Station cars had "Hazel Park", "Mahtomedi" and "White Bear" destination signs.) As new cars were built and older cars rebuilt or re-assigned through the years, a large



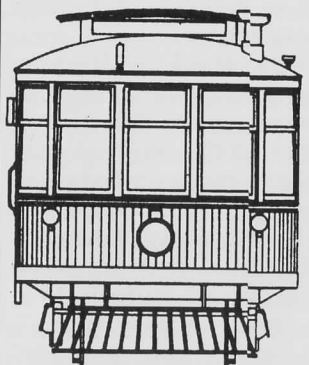
Motor running forward by Day or Night as a Regular Carded Train. See rule.



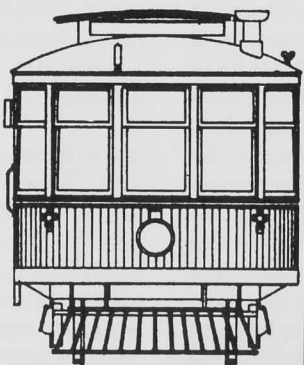
Motor running forward by Day displaying GREEN FLAG signals for a following section. See rule.



Motor running forward by Night displaying GREEN LIGHT signals for a following section. See rule.



Motor running forward by Day displaying WHITE FLAG signals indicating an Extra Train not carded. See rule.



Motor running forward by Night displaying WHITE LIGHT signals indicating an Extra Train not carded. See rule.

number of cars came to have marker brackets which most often were not removed when cars were re-assigned. One-man cars operating on the St. Paul-Mahtomedi line used them until the line was abandoned in 1951.

Cars assigned to the single-track St. Louis Park and Robbinsdale lines also received marker brackets for targets and classification lights beginning in 1910.

Electric Classification Lights

The electric classification lights were introduced in March 1910. The light bulbs inside the castings were clear. The holders on the light castings held either metal targets or glass lenses. Targets were yellow, green, and white. Lenses were green and white. The yellow targets were normally inserted in the holders by day and night to indicate a scheduled single train. The train number targets were red with silver numbers, 1 through 10 (11- 14 added later for the Stillwater Local cars.)

Lowry's Private Car received the lamps in 1908, and most of the non-revenue work cars and snow plows carried either marker brackets or classification lights. All this equipment ran as unscheduled extras, hence the need for the markers.

The markers and classification lights were used on single track lines to alert opposing trains that they were meeting multiple cars running as sections under a single train number. This graphic was made to educate trainmen on their proper use.



the Electric Way!



VISITORS can readily reach all points of interest at the Head of the Lakes by our street cars and the connecting Bus lines of the Duluth-Superior Coach Company at very little expense.

This leaflet contains a brief list of the most interesting trips. The route number or letter and sign of the car or bus to be taken, the interval between cars, the approximate round trip time from the business center and the round trip fare is shown.

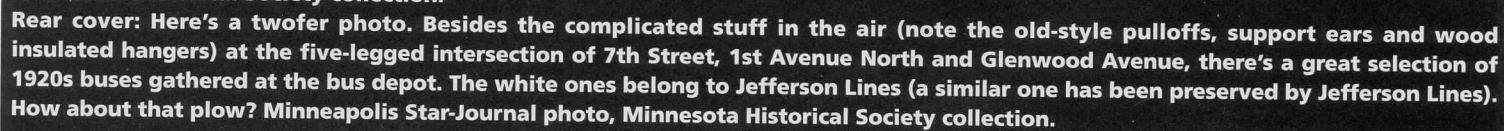
Street cars and busses equipped for your comfort, convenience and safety are at your service. Employees will gladly answer your questions and do all they can to make your visit a pleasant one.

For the leaving time of cars or busses, time of connecting trips, or other information, you are invited to inquire at the car starter's stand, call at or telephone the office of the company.

	In Duluth	In Superior
Car Starter's Stand	3rd Ave. W. & Superior St.	Belknap St. & Tower Ave.
General Office	2631 W. Sup. St.	4th St. & Ogden Ave.
Telephone No.	Melrose 260	Broad 286

TWIN PORTS ELECTRIC LINES

Take Route No.	SUGGESTED TRIPS FOR SUMMER VISITORS	Cars Run Every	Round Trip Time	Round Trip Fare
IN DULUTH—				
Any west bound car to Seventh Ave. West. Then transfer to the Inclined Railway.	A sensation you cannot afford to miss is a trip up the INCLINED RAILWAY. It runs straight up the hillside and rises 530 feet. Automatic devices make it absolutely safe. From the "Lookout" station at the top a panoramic view of all Duluth and Superior is obtained. This makes a trip you will long remember. Summer visitors often go up again in the evening when the lights are on all around the bay to view a fascinating moonlight scene.	15 mins.	35 mins.	12c
	A surface line at the top serves the suburb of Duluth Heights.	30 mins.	50 mins.	12c
22 (East Eighth St. Line)	At the scenic Chester Creek bridge on this line is a natural park well worth seeing. A short walk along the winding paths beside the stream brings you to the lower car lines by which you can return. Tall shade trees afford shelter from the summer sun all along the way.	20 mins.	50 mins.	12c
2 (West Duluth and Aerial Bridge Line)	A very short ride takes you to the Duluth Ship Canal and the Aerial Bridge. No visit to Duluth is complete without a trip across this bridge. It is the only one of its kind on this continent.	10 mins.	25 mins.	12c
	If you desire, you may obtain a transfer and continue your ride on the other side of the canal, where cars run down the long, narrow point of sand through pine groves all the way. Summer visitors will want to spend some time on the beach of Lake Superior, easily reached at the end of the line.	20 mins.	1 hr. 5 mins.	12c
	A very beautiful natural park, which you will enjoy visiting can be reached by boarding this car and asking the conductor to let you off at St. Marie St. A half hour's walk along a wooded lane beside a stream brings you to the lower car line, by which you can return.	20 mins.	1 hr. 15 mins.	12c
7 (Woodland Line)	Two bus lines, connecting with the Woodland Ave. car line offer visitors pleasant and interesting sight-seeing trips:			
	THE MORLEY HEIGHTS BUS can be boarded at Oxford St. It makes a loop trip of a mile and a half through a suburban residence district.	20 mins.	1 hr.	12c
	THE HOMECROFT AND ARNOLD BUS meets the street cars at the end of the line. It makes a six-mile loop trip through the countryside.	40 mins.	1 hr. 45 mins.	32c
61 (Lester Park Line)	A pleasant ride along the lake shore takes you through a beautiful residence district to the long-famous picnic grounds along the Lester River.	20 mins.	1 hr. 20 mins.	12c
9 (E. 4th, Gary-New Duluth Line)	This trip takes you through the western end of the city beyond the "Point of Rocks." A good view can be had of the West Duluth industrial and residential sections, immense ore docks, the Riverside shipyards, the "Model City" at Morgan Park, the huge steel plant, cement plant, beautiful St. Louis River and the suburb of New Duluth.	20	2 hrs.	12c
	THE FOND DU LAC BUS LINE operates from the end of the New Duluth car line, a distance of about three miles to a beautiful suburb on the banks of the St. Louis River. Fond du Lac was the site of a trading post in the early history of the head of the Lakes. It is rich in Indian legend.	Hourly service after 2 P. M.	2 hrs. 45 mins.	50c
A TRIP BETWEEN THE TWIN PORTS CITIES				
By Street Car S or G 3 or 24	when going to Superior, Wis. when going to Duluth, Minn.			24c Ticket
	On this trip you get the best views of the harbor, docks, elevators, mills and shipyards as well as the main retail sections of both cities. The center of the swinging drawbridge is the dividing line between the states of Minnesota and Wisconsin. The draw is one of the longest in the world.	10 mins.	1 hr. 6 mins.	32c Cash
By Bus (Duluth-Superior)	AN INTERSTATE COACH SERVICE is provided over the six miles between the business centers of the two cities. For a moderate fare you can make the trip in rapid, De Luxe Coaches equipped with air cushioned seats.	20 mins.	52 mins.	50c
IN SUPERIOR—				
B Billings Park	A short ride on this line takes you to beautiful Billings Park, one of the most attractive outdoor spots in the Northwest. This park is located on high ground and affords a magnificent view up and down the St. Louis River. There are wooded picnic grounds, winding paths, a bathing beach and boats available.	20 mins.	50 mins.	12c Ticket 20c Cash
A Allouez Line	An interesting ride on this line takes you to the Allouez ore docks. Along the way you can see mills and elevators, the Nemadji River and the Superior entry to the St. Louis Bay.	20	1 hr.	12c Ticket 20c Cash
	THE ITASCA BUS connects with street cars at the end of the Allouez car line, extending the service one and a half miles.	20 mins.	45 mins.	20c Ticket 40c Cash
S South Superior	On this line you reach the suburb of South Superior, passing the Tri-State Fair grounds on the way.	20	40	12c Tickets 20c Cash





5200

